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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
08/928,893	09/12/1997	HEIKKI HEIKKILA	85940/15	1188

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KENYON & KENYON
ONE BROADWAY
NEW YORK, NY 10004

EXAMINER

NAFF, DAVID M

ART UNIT

PAPER NUMBER

1651

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

08/928,893

Applicant(s)

Heikkila et al

Examiner

Hoff

Group Art Unit

1651

—The MAILING DATE of this communication appears on the cover sheet beneath the correspondence address—

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, such period shall, by default, expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).

Status

- ☒ Responsive to communication(s) filed on 11/26/02
- ☒ This action is FINAL.
- ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

- ☒ Claim(s) 1, 3, 5-9, 11-13, 15, 16, 19-21, 23-31 + 32-34 is/are pending in the application.
- ☐ Of the above claim(s) 32-34 is/are withdrawn from consideration.
- ☐ Claim(s) _____ is/are allowed.
- ☒ Claim(s) 1, 3, 5-9, 11-13, 15, 16, 19-21, 23-31 is/are rejected.
- ☐ Claim(s) _____ is/are objected to.
- ☐ Claim(s) _____ are subject to restriction or election requirement.

Application Papers

- ☐ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.
- ☐ The proposed drawing correction, filed on _____ is ☐ approved ☐ disapproved.
- ☐ The drawing(s) filed on _____ is/are objected to by the Examiner.
- ☐ The specification is objected to by the Examiner.
- ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119 (a)-(d)

- ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).
 - ☐ All ☐ Some* ☐ None of the CERTIFIED copies of the priority documents have been received.
 - ☐ received in Application No. (Series Code/Serial Number) _____
 - ☐ received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

*Certified copies not received: _____

Attachment(s)

- ☐ Information Disclosure Statement(s), PTO-1449, Paper No(s). _____
- ☐ Interview Summary, PTO-413
- ☐ Notice of Reference(s) Cited, PTO-892
- ☐ Notice of Informal Patent Application, PTO-152
- ☐ Notice of Draftsperson's Patent Drawing Review, PTO-948
- ☐ Other _____

Office Action Summary

The amendment of 11/26/02 amended claims 1, 5, 23 and 31, and canceled claim 31.

Claims 32-34 are withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected invention, there being no allowable generic or linking claim. Applicant timely traversed the restriction (election) requirement in Paper No. 40 (filed 4/15/02).

Claims examined on the merits are 1, 3, 5-9, 11-13, 15, 16, 19-21 and 23-31.

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claim Objections

Claim 23 is objected to because of the following informalities: in line 6, -- and -- should be inserted before "waste", for a proper Markush group. Appropriate correction is required.

Claim Rejections - 35 USC § 112

Claims 1, 3, 5-9, 11-13, 15, 16, 19-21 and 23-31 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Adequate support is not found in the specification for a glucose/xylose ratio of "about .25 to about 8", a glucose content of "greater than 10% of carbohydrates in the starting material", and converting "over about 50% of the xylose" in the starting material to xylitol, and "over about 40% of the glucose" in the starting material to

ethanol as required in claims 1, 23 and 31. The ratio range of glucose/xylose, and ranges for xylose and glucose converted are not recited in the specification, and there is not found adequate support for the recited ranges in the examples.

5 ***Claim Rejections - 35 USC § 112***

Claims 1, 3, 5-9, 11-13, 15, 16, 19-21 and 23-31 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

10 Claim 1 and claims dependent thereon are confusing and unclear by claim 1 in line 3 being unclear as to the relationship of the "hydrolyzed lignocellulose-containing material" to that required in the claim preamble. It is suggested that -- the -- be inserted before "hydrolyzed" in line 3.

15 In line 12 of claim 1, "bottom product" is uncertain as to meaning and scope. Additionally, a bottom product has not been required to be produced previously, and it is unclear as to how such a product results from distillation.

20 Claim 23 and claims dependent thereon are confusing and unclear by claim 23 in line 14 not having clear antecedent basis for "the free xylose". It is suggested that "free" be deleted. In line 15 of the claim, there is not clear antecedent basis for "said hexose" since hexose has not been required to be present. It is suggested that "hexose" be changed to -- glucose --.

Claim 31 is confusing and unclear as to the meaning and scope of "extraction" in line 4 since the specification fails to describe process steps and conditions for extraction after partially hydrolyzing.

5 Claim 31 is confusing and unclear by failing to set forth positive process steps so that it is clear as to the order in which the steps are performed, and the relationship of the steps to each other. Requiring a final hydrolysis being carried out on the extracted material in lines 6 and 7 is confusing since there is not clear antecedent basis for "the extracted material", and material from extraction has been previously
10 fermented to produce xylitol. Requiring the final hydrolysis to produce a glucose/xylose ratio is confusing since xylose has been previously converted to xylitol. After fermenting to produce xylitol, the material from extraction no longer exists and there is no xylose present. In line
15 10 of the claim, requiring converting "hexoses" to ethanol is confusing since hexoses have not been previously required to be present. It is suggested that "hexoses" be changed to -- glucose --. The claim is further unclear as to whether converting over about 50% xylose to xylitol occurs during fermentation of glucose to ethanol or during the fermenting of the prehydrolysate. After fermenting the prehydrolysate to produce
20 xylitol, there is no xylose present.

Claim Rejections - 35 USC § 103

Claims 1, 3, 5-9, 11-13, 15, 16, 19-21 and 23-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Heikkila et al (5,081,026) in view of Chahal (5,047,332).

Heikkila et al disclose (paragraph bridging cols 2 and 3) fermenting a hydrolyzed lignocellulose-containing material to produce a hydrolyzate containing xylose and hexoses, fermenting the hydrolyzate with yeast to produce a fermented product containing xylitol, ethanol and yeast,
5 removing yeast, removing ethanol by evaporation or distillation, chromatographically separating a xylitol-rich fraction and recovering xylitol from the xylitol-rich fraction by crystallizing the xylitol.

Chahal discloses (col 5, lines 20-29) producing ethanol for use as fuel from lignocellulose-containing biomass by fractionating
10 lignocellulose into cellulose, lignin and hemicelluloses, hydrolyzing the cellulose with cellulase to produce glucose and fermenting the glucose with yeast to produce ethanol.

It would have been obvious to obtain ethanol in the process of Heikkila et al as suggested by Chahal by hydrolyzing cellulose of
15 lignocellulose to glucose so that yeast can ferment the glucose to ethanol. The xylose obtained by Heikkila et al results from hemicellulose (col 1, lines 55-61). It would have been apparent from Chahal that lignocellulose material contains cellulose in addition to hemicellulose, and the cellulose can be hydrolyzed with cellulase to
20 glucose for fermenting to ethanol. Thus, it would have been expected that cellulose in addition to hemicellulose is present in the lignocellulose material used by Heikkila et al (col 3, lines 51-68) as a starting material, and it would have been obvious to hydrolyze the cellulose to glucose to provide production of ethanol for use as
25 suggested by Chahal. Producing xylitol and ethanol in separate steps as

in claim 31 would have been a matter of obvious choice depending on individual preference and convenience within the ordinary skill of the art. The glucose/xylose ratio range and percent of glucose and xylose conversion as claimed would have been inherent when carrying out the process of Heikkila et al as set forth above. Moreover, it would have been obvious to optimize conditions to maximize xylitol and ethanol production since these are desired products.

Response to Arguments

Applicant's arguments filed 11/26/02 have been fully considered but they are not persuasive.

Applicants urge that the claims now require a glucose/xylose ratio of "about .25 to about 8", a glucose content of "greater than 10% of carbohydrates in the starting material", and converting "over about 50% of the xylose" in the starting material to xylitol and "over about 40% of the glucose" in the starting material to ethanol. Applicants point out that in Example 2, Heikkila et al requires a xylitol/glucose ratio of 21:1, and that the presently claimed process produces ethanol and xylitol in high yield.

This argument is unpersuasive since the conditions suggested by Heikkila et al and Chahal for hydrolyzing would have inherently produced a ratio and percent conversion within the claimed ratio and percent conversion ranges. The claimed glucose/xylose ratio range encompasses a xylose/glucose ratio of 21:1 since in the claimed range the xylose can be 8 and the glucose .25. Furthermore, it would have been obvious in Heikkila et al when producing ethanol as suggested by Chahal to optimize

conditions to maximize ethanol and xylitol production since these are desired products.

Double Patenting

Claims 1, 3, 5-9, 11-13, 15, 16, 19-21 and 23-31 are rejected under
5 the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-28 of U.S. Patent No. 5,081,026 in view of Chahal for reasons set forth above in the 35 U. S. C. 103 rejection.

It would have been obvious to produce ethanol in the claimed process of the patent to obtain ethanol for use as suggested by Chahal by
10 hydrolyzing cellulose in the starting material with cellulase to obtain glucose that can be fermented to ethanol.

Response to Arguments

The comments set forth above in response to arguments also apply to this rejection.

15 Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set
20 to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed,
25 and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from

the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications
5 from the examiner should be directed to David M. Naff whose telephone number is (703) 308-0520. The examiner can normally be reached on Monday-Thursday and every other Friday from about 8:30 AM to about 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, a
10 message can be left on voice mail.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mike Wityshyn, can be reached at telephone number (703) 308-4743.

The fax phone number is (703) 872-9306 before final rejection or
15 (703) 872-9307 after final rejection.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-0196.

20

DMN
2/24/03


DAVID M. NAFF
PRIMARY EXAMINER
ART UNIT 1651